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54 Power Supply Device for Wireless Communication Equipment
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Specifications

1. Name of Patent

Power Supply Device for Wireless Communication Equipment

2. Area of Patent

Human-power sourced power generator which can supply electric power to a load by inducing AC voltage on both ends of stator coil with middle tap according to rotation of a rotor made of permanent magnet,

First and second electric transistor whose collector electrodes are connected to both ends of the rotor coil of the power generator described above.

First resistor connected between the collector of the first electric transistor and a base,

Second resistor connected between the collector of the second electric transistor and a base,

First impedance measure, that consists of third resistor, first small signal diode, first light-emitting diode and first Zener diode, and that connects the base of the first electric transistor described above to the collector of the second electric transistor described above.

Second impedance measure, that consists of fourth resistor, second small signal diode, second light-emitting diode and second Zener diode, and that connects the base of the second electric transistor described above to the collector of the first electric transistor described above,

First power-rectification diode, whose anode is connected to emitter of the first electric transistor and whose cathode is connected to anode of high-capacity capacitor,

Second power-rectification diode whose anode is connected to emitter of the second electric

transistor, and cathode is connected to anode of high-capacity capacitor described above,

Power supply device for a wireless communication equipment, which consists of the high-capacity capacitor described above whose anode is connected to cathodes of the first and the second power-rectification diodes, and cathode is connected to the middle tap of the stator coil described above, and is designed for a load of wireless communication equipment to be connected between the anode and the cathode of the high-capacity capacitor parallel to the high-capacity capacitor.

3. Detailed Description of Invention

This invention is with regard to a power supply device for wireless communication equipment which empowers wireless communication equipment by generating electric power only with human-power or animal-power.

There are several different kinds of wireless communication equipment such as fixed, semi-fixed, mobile and portable. All of those can be used under any conditions a human-being can survive. Although, according to existing technologies, wireless communication equipment can not operate for a long time with an internal power supply unless there is an outside power supply of certain quality. Therefore, when it comes to uses such as military, expeditionary, and disastrous, it was not possible to satisfactory operate wireless communication equipment on-site without supplying high-quality battery or fuel.

The objective of this invention is to solve those existing problems by providing a power supply device for wireless communication equipment which is simple but very safe, and only requires human-power as energy supply.

Power supply device for wireless communication equipment of this invention consists of power generator with human-power energy supply and related electronic circuit. The rotor of the power generator with human-power energy supply is made of permanent magnet. AC voltage is induced according to rotation of a rotor. Stator coil has a middle tap and supplies electric power to a load from both sides. Related electronic circuit consists of fist and second electric transistors, first and second power-rectification diodes, a high-capacity capacitor, first and second impedance measures, and first and second resistors.

The first electric transistor is connected to an end of the stator coil, an end of the second impedance measure and an end of the first resistor. The base of the electric transistor is connected to the other end of the first resistor and an end of the first impedance measure. The emitter of the first electric transistor is connected to the anode of the first power-rectification diode.

The collector of the second electric transistor is connected to the other end of the stator coil, the other end of the first impedance measure and an end of the second resistor. The base of the

second electric transistor is connected to the other end of the second resistor and the other end of the second impedance measure. The emitter of the second electric transistor is connected to the anode of the second power-rectification diode. The first impedance measure is connected from the base of the first electric transistor to the collector of the second electric transistor, and consists of the third resistor, the first small-signal diode, the first light-emitting diode and the first Zener diode. The second impedance measure is connected from the base of the second electric transistor to the collector of the first electric transistor, and consists of the fourth resistor, the second small-signal diode, the second light-emitting diode and the second Zener diode.

The first small-signal diode and the first light-emitting diode are connected in the direction of the current flow from the base of the first electric transistor to the collector of the second electric transistor, while the first Zener diode is connected in this direction, it shows a Zener characteristic.

The second small-signal diode and the second light-emitting diode are connected in the direction of the current flow from the base of the second electric transistor to the collector of the first electric transistor, while the second Zener diode is connected in this direction, it shows a Zener characteristic.

Cathodes of the first and second power-rectification diodes are both connected to the anode of the high-capacity capacitor, and the anode of the high-capacity capacitor is connected to the middle point of the stator rotor. A wireless communication device can be connected between the anode and the cathode the high-capacity capacitor as a parallel load.

With those connections, because a current flows through the first and second impedance measures only when voltage of the power supply is higher than a certain threshold voltage, P-N junction between the base of the first and the second electric transistors and the emitter is reverse-biased. Consequently, the first and the second electric transistors are cut-off.

Therefore, the electronic circuit of the wireless communication equipment would not be broke down because no excess voltage would be applied to a load.

Following is explanation of the invented equipment with a figure.

Figure.1 is systematic figure of an implementation example of a power supply device for wireless communication equipment constructed with these inventions.

In Figure.1, the rotor 3 is made of permanent magnet and can turn with supply of human-power or animal-power.

When the rotor 3 turns, AC voltage is induced at the coil 1 of the stator. The frequency of the induced voltage is proportional to that of rotor 3, and the value of the voltage is proportional to the angular velocity of the rotation. Induced AC voltage at the both ends of the stator coil has the same amplitude and a 180 degree phase difference, compared to the voltage at the middle point 2. Those output voltages are applied to collectors of the first electric transistor 4 and the

second electric transistor 5 respectively. The voltage applied to the collector of the first electric transistor 4 flows through the emitter and then is applied to the high-capacity capacitor 16 through the first power-rectification diode 10. The voltage applied to the collector of the second electric transistor 5 flows through the emitter and then is applied to the high-capacity capacitor 16 through the second power-rectification diode 11.

Because there is 180-degree phase difference between the voltage applied to the collector of the first electric transistor 4 and that applied to the collector of the second electric transistor 5, those voltages do not arrive to each collector of the electric transistor at the same time, but do so alternately.

Suppose positive voltage is applied the collector of the first electric transistor 4. If the value of voltage is not too high and there is no current flowing through the third resistor 14, the positive voltage emerged at the collector of the first electric transistor 4 is applied to the base of the first electric transistor 4 through the first resistor 12, and then P-N junction between the base of the transistor and the emitter is biased. Sequentially, base current flows though the first electric transistor 4 and the first electric transistor 4 becomes conductive. The voltage induce at the stator coil 1 charges the high-capacity capacitor 16 and provides a load with electric power, through the first electric transistor 4 and the first power-rectification diode 10. In case the value of the voltage induced at the stator coil 1 exceeds a certain threshold value, 16V for example, it conducts the first Zener diode 7 though the base of the first electric transistor 4, the third resistor 14, the first small-signal diode 8 and the first light-emitting diode 25. The electric potential difference between the both ends of the first Zener diode 7 is the threshold value, 16V in this example. Then, when the value of the voltage at the stator coil 1 increases, the increment voltage emerges at the both ends of resistor 12, therefore base voltage of the first electric transistor becomes lower than emitter voltage, and the first electric transistor is cutoff.

Because the second transistor 5 is connected to the circuit symmetrically with the first transistor 4, the second transistor 5 is cutoff when the first transistor 4 is cutoff.

In this case, electric current flows thorough the first and second light-emitting diode 24, 25, therefore those diodes emit light to show that driving force is invalid. If one uses for an electric double layer capacitor as the high-capacity capacitor 16, capacity as high as a couple hundred farad can be easily achieved.

Suppose the high-capacity capacitor is charged up to maximum value, 16V for example, and then is discharged down to minimum discharge voltage, 9V for example. In this case, only low-consumption receiving part 18 is active; thus wireless communication equipment can operate for quite a long period.

Because a electric double layer capacitor, which is different from a storage battery, does not show power loss accompanied with recharging, nor end of life accompanied with consumption

of chemical active material, it can operate semi permanently

The receiving part 18 and the transmission part 19 of wireless communication equipment consume quite much DC electric power at an output stage. On the other hand, because the voltage induced at an oscillation stage has small allowable bands of fluctuations, a device may not perform satisfactory at an oscillation stage when voltage fluctuations are large. Therefore, electric power is supplied directly to the high-capacity capacitor 16 at an output stage, and is fed through electric voltage regulator 17 at an oscillation stage.

When the transmission part 19 is active, assuming terminal voltage between the anode and the cathode of the high-capacity capacitor decreased to below certain value, 9V for example, the meter of the receiving display part 27 stops deflecting, and the neon-lamp of the transmission display part 26 does not put on a red light.

In this case, by driving the power generator using human-power or animal-power, one simply has to recharge the high-capacity capacitor 16 until the first and the second light-emitting diodes 24, 25 emit green light, for example.

For this invention, electric power is supplied to wireless communication equipment from the power generator, which can be driven by human-power or animal-power, intervened with the control electronic circuit and the high-capacity capacitor. This electronic circuit cuts off over-voltage and makes it possible to supply very stable electric power to wireless communication equipment even with irregular rotation of the power generator.

Power supply device for wireless communication equipment designed with this patent possesses the first and the second impedance measures to cut off over-voltage. It is possible to make it easier to handle equipment by building-in various display devices.

Accordingly, it is easy for a person who is not a specialty engineer to operate the power supply device for wireless communication equipment. Moreover, equipment can operate under special circumstances such as in a tunnel. Using this power supply device, it is possible to stably operate wireless communication equipment during an accident in a mountain or an emergent disaster.

4. Explanation of a Figure

Figure1 shows a circuit structure example of implementation of the power supply device for wireless communication equipment based on this invention together with a block figure of wireless communication equipment.

1. Stator coil of the power supply device
2. Middle point of stator coil of the power supply device
3. Rotor of the power supply device

4.5. Electric transistor

6.7. Zener diode

8.9. Small-signal diode

10. 11 Power-rectification diode

12. 13. 14. 15. Resistor

16. High-capacity capacitor

17. Power supply regulator

18. Receiving part

19. Transmission part

20. Speaker

21. Microphone

22. Antenna relay

23. Antenna

24. 25. Light-emitting diode

26. Transmission display part

27. Receiving display part

28. Switch

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